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Structural Imbalances in Canadian Labour Markets

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Contents

Acknowledgments vii

Foreword ix

Abstract xi

Introduction 1

The Vacancy Data in Canada: Availability and Limitations 2
- The Job Vacancy Survey 3
- Notified Job Vacancies 3
- The Help-Wanted Index 4
  - The HWI/JVS Relationship, 1971-78 4

The Unemployment/Normalized Help-Wanted-Index Relationship in Canada, 1966-88 5
- The Unemployment/Derived Vacancy-Rate Relationship 10
- The Unemployment/NHWI Relationship by Region 13

Why Has the Unemployment/Vacancy Relationship Shifted? 13
- A Simplified UV Model 13
- Inflows into Unemployment and the UV Curve 18
- Outflows from Unemployment and the UV Curve 21
  - Unemployment Insurance Benefits 21
  - Employment Protection Laws 22
  - Minimum Wages 23
  - Unions 23
- Long-Term Unemployment 24
  - Long-Term Unemployment and the UV Curve: Evidence 26
- Mismatches and the UV Curve 34
  - The Regional Dimension 34
  - Estimating Intra- and Interregional Effects 36
  - Interregional Effects: Dispersions in Unemployment Rates and Employment Growth Rates 39
  - Dispersion of Regional Unemployment Rates 39
  - Dispersion of Regional Employment Growth Rates 41
- Industrial Mismatches and the UV Curve 41

Conclusions 43

Notes 47

References 51

Tables

1 Normalized Help-Wanted Index and Unemployment Rate, Canada, 1966-88 (Annual Data) 8
2 Derived Vacancy Rate and Unemployment Rate, Canada, 1966-88 (Annual Data) 11
3 Normalized Help-Wanted Index and Unemployment Rate, by Region, Canada, 1966-88 (Annual Data) 15
4 Permanent and Temporary Job-Separation Rates, Canada, 1978-86 19
5 Normalized Help-Wanted Index and Unemployment Rate, Canada, 1976-88 (Quarterly Data) 27
6 Derived Vacancy Rates and Unemployment Rate, Canada, 1976-88 (Quarterly Data) 29
7 Normalized Help-Wanted Index and Unemployment Rate, by Region, Canada, 1976-88 (Quarterly Data) 30
8 Shift in the Unemployment/Normalized Help-Wanted-Index Curve, by Region, Canada, 1966-88 (Annual Data) 37
9 Dispersion of Unemployment Rates and Employment Growth Rates across Regions and across Industries, Canada, 1966-89 40

Charts

1 Unemployment/Normalized Help-Wanted-Index Relationship, Canada, 1966-88 6
2 Unemployment/Derived Vacancy-Rate Relationship, Canada, 1966-88 10
3 Unemployment/Normalized Help-Wanted-Index Relationship, by Region, Canada, 1966-88 14
4 Stylized Unemployment/Vacancy Curve 17
5 Unemployment Inflows and Outflows, Canada, 1976-89 20
6 Regional Dispersion, Vacancies, and Unemployment 38

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Foreword

One of the important functions of the labour market is to match unemployed workers with the available jobs. The success of this matching process determines both the level of unemployment in the economy and its duration for those who are unemployed. Much of the unemployment and many of the vacancies are short-lived or "frictional" in nature, reflecting only the time required by workers and firms to acquire the necessary information and make the appropriate adjustments. However, the characteristics of unemployed individuals and the skills demanded by employers are not always well matched; moreover, such mismatches may persist over a long period of time. The simultaneous and persistent existence of high unemployment and a large number of job vacancies is symptomatic of deep-rooted problems in the structure of the labour market.

This paper identifies the nature of structural imbalances in the Canadian labour market by analysing the relationship between unemployment and job vacancies for Canada as a whole and for five major regions within the country. Because time-series data on job vacancies are not available, an alternative measure, based on the help-wanted index published by Statistics Canada, forms the basis of the analysis.

The findings reported here suggest that structural imbalances in the Canadian labour market have grown in recent years. The authors find that this development can be attributed, in large part, to growth in long-term unemployment during the 1980s and to increased disparities in regional unemployment rates. The authors suggest that if unemployment is to be reduced, macroeconomic policy should be supplemented with a range of regionally targeted policies to improve the functioning of labour markets. They also recommend that a job-vacancy survey be conducted for the collection of data over a period of several years.

This paper was prepared for the Unemployment Issues Group of the Economic Council of Canada. An earlier version provided background information for the Council's 25th Annual Review, *Back to Basics*. Surendra Gera and Syed Sajjadur Rahman are economists on the staff of the Council. Jean-Louis Arcand is currently a graduate student at the Massachusetts Institute of Technology.

Judith Maxwell
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Abstract

The purpose of this paper is to identify the nature of structural imbalances in the Canadian labour market by analysing the relationship between unemployment and job vacancies. Two questions are specifically addressed in the paper. First, have structural imbalances in the Canadian labour market increased over the past three decades, and particularly in the 1980s? Second, if they have, what factors have contributed to that increase?

Three potential sources of imbalances are examined with particular attention: 1) the regional nature of the Canadian economy; 2) the rise in the incidence of long-term unemployment (defined as a continuous period of unemployment of 12 months or more); and 3) differences in the rate of growth of employment across industrial sectors.

The analytical approach consists in preparing econometric estimates of the unemployment/vacancies (UV) curve and then identifying the factors that cause it to shift. An outward shift of the UV curve indicates increased structural mismatches. The UV relationships are estimated for Canada as a whole and for five regions within Canada, using two proxies for the unavailable vacancies data – the normalized help-wanted index and a derived vacancy rate.

The major findings of the paper are as follows:

- For both Canada as a whole and for all the regions, the unemployment/normalized help-wanted-index relationship shifted outward over the period 1966-88, indicating growing structural imbalances.

- An increase in long-term unemployment as a proportion of total unemployment was the major cause of the shift in the unemployment/vacancy relationship at the national level, as well as in the Atlantic and Prairie regions and in British Columbia.

- Both inter- and intraregional effects played a significant role in shifting the national UV relationship. However, interregional disparities were found to be the dominant factor, accounting for 54 per cent of the total shift.

- The dispersion in employment growth rates across industrial sectors did not seem to play a role in explaining the shifts in either the national or regional UV relationships.

The observed increase in structural imbalances across all regions suggests that if the policymakers are to reduce unemployment, macroeconomic policy must be supplemented by a range of region-specific policies that will improve the functioning of labour markets.

Structural Imbalances in Canadian Labour Markets

READER'S NOTE

The reader should note that various conventional symbols similar to those used by Statistics Canada have been used in the tables:

... figures not appropriate or not applicable
– nil or zero.

Details may not add up to totals because of rounding.

Introduction

Canada's unemployment rate has shown an outward trend since the 1960s. The annual rate rose from about 4 per cent during the mid-1960s to about 8 per cent in the late 1980s. It exceeded the 10-per-cent mark during the period 1982-86 and reached a high of 12.7 per cent in the fourth quarter of 1982. Indeed, the experience of the 1980s has been one of high and persistent unemployment.

The inquiry about the outward trend in the unemployment rate has been along various paths. Some researchers have focused on empirical assessments of the impact of policy variables and of the structural aspects of the Canadian economy on the natural rate of unemployment [Burns 1990; Coe 1989; Fortin 1989; Rose 1988; Reid and Smith 1981; Beach and Kaliski 1986; Charette and Kaufmann 1987; and Fortin and Newton 1982]. A consensus seems to have emerged in this literature that the natural rate has risen over time.

Another approach focuses on structural imbalances in the labour market. A structural imbalance occurs when the characteristics of unemployed workers (in terms of skills, work experience, location, or occupation) differ from those required for the jobs that are available. It has been argued that structural imbalances in labour markets have worsened at the national as well as the regional levels in recent years [Economic Council of Canada 1976; Reid and Meltz 1979; and Betcherman 1986]. As a result, the Canadian labour market may have drifted into a situation characterized by the simultaneous presence of more unemployment and more job vacancies than previously.

This paper builds on the structural-imbalance approach. It analyses a number of structural shifts in the Canadian labour market that may have impeded the speed and success of the process of matching people and jobs. Two questions form the major theme of the paper. First, have structural imbalances in the Canadian labour market increased between 1966 and 1988, especially during the 1980s? And, second, what factors have contributed to the growth of these structural imbalances? The growth in labour market imbalances in Canada and its regions is examined by using Beveridge curves, which portray the relationship between vacancies and unemployment. Three potential sources of imbalance are given particular attention.

First, the regional nature of the Canadian economy suggests that any analysis of the national labour market would be incomplete if proper attention were not paid to regional markets. Indeed, growing regional disparities in economic performance are an important determinant of national mismatches [Lazar 1977].

Second, the rise in the proportion of the long-term unemployed (individuals continuously unemployed for a year or more) in recent years indicates another

possible source of mismatch. The long-term unemployed form a pool of labour whose characteristics do not appear to be in demand. The identification of the impact of this group on the unemployment situation, both nationally and regionally, is important for the formulation of labour market policy.

Third, it has been argued [Lilien 1982] that sectoral shifts have led to a rise in unemployment by causing mismatches between labour demand (in expanding sectors) and the available labour supply (consisting among others, of unemployed labour originating from declining sectors). The shifting patterns of labour demand have obvious implications for structural imbalance in the labour market.

A major problem in analysing the unemployment/vacancy relationship for Canada is the absence of time-series data on vacancies over a statistically meaningful period of time. This paper uses the help-wanted index (HWI) produced by Statistics Canada as a proxy. As Section II shows, the HWI can serve as a useful approximation of the vacancy situation.

The format of the rest of the paper is as follows. Section III presents time-series evidence on whether the national and the regional unemployment/normalized help-wanted-index (NHWI) relationships (as described by the Beveridge curves) have shifted outward. This evidence strongly supports the conclusion that outward shifts have indeed occurred and points to the growth of structural imbalances in the Canadian labour market. Section IV presents a simplified model explaining the various factors that can cause outward shifts in unemployment/vacancy relationships and analyses the major sources of structural imbalances. The major new finding of this investigation is that the increase in the proportion of long-term unemployment in the 1980s contributed to the growth of imbalances in Canadian labour markets. Two other sources of structural imbalance – regional and industrial mismatches in the Canadian economy – are also examined in this section. Finally, Section V summarizes the major findings about the magnitude and causes of labour market imbalances during the past two decades.

The Vacancy Data in Canada: Availability and Limitations

The major methodological problem in analysing the unemployment/vacancy (UV) relationship for Canada is the absence of a comprehensive and consistent job-vacancy series. There are two direct sources of job-vacancy information in Canada: the Job Vacancy Survey (JVS) of Statistics Canada, which collected data from 1971 to 1978; and the unpublished data on notified job vacancies available at Employment and Immigration Canada for fiscal years 1978-79 to 1986-88. These two sources of data are not mutually consistent.

A proxy for the vacancy data is also available in the form of the Statistics Canada's help-wanted index.

The Job Vacancy Survey

The Job Vacancy Survey was based on data obtained through a sample survey of firms employing approximately 90 per cent of all workers in Canada. The survey did not cover military, fishing, trapping, agriculture, and domestic services. Beginning in 1971, it was conducted twice monthly until it was discontinued at the end of 1978. The definition of job vacancies used in the survey included jobs that were immediately available at the time of the survey, that had been vacant for at least a full day, for which recruiting actions to fill the vacancies had been undertaken by employers, and that were available to people outside the firm. Unfilled vacancies were measured at six points in time throughout each quarter. The survey postulated that these points were an approximation of the general level of vacancies on any day of the reference period. The resulting job-vacancy rates were expressed as the number of vacancies per 1,000 existing jobs in the sample. These estimates were adjusted by using appropriate weights to account for non-responses.[1]

This database on vacancies has a number of shortcomings. The major weakness has to do with the brief span (only eight years) covered by the available series. This has led a number of authors to develop their own estimated vacancy series, using the actual JVS to extrapolate for an expanded series [Denton, Feaver, and Robb 1975; Betcherman 1986]. A further problem stems from the fact that the reported vacancies generally represent only a small proportion of the total number of jobs available. However, correction factors have been developed to approach a more realistic rate. Abraham [1983] considers a number of possible sources of downward bias in the U.S. and Canadian JVS data and assesses the likely magnitude of each understatement in the reported vacancy rates that can be attributed to each source.

Notified Job Vacancies

In Canada, the data on notified job vacancies, as voluntarily supplied by employers, are collected by Canada Employment Centres across the country. Notified job vacancies represent approximately 33 per cent of the total at any one time in countries such as the United Kingdom [Jackman and Roper 1987]. We believe that number is not much different for Canada.

Although the data on notified job vacancies seriously underrepresent the actual number of available jobs in Canada, they may be useful in providing some insights into the unemployment/vacancy relationship. One advantage

of these data is that they are available for periods more recent than those covered by the JVS data.[2]

The Help-Wanted Index

The help-wanted index (HWI)[3] is a measure of the change in the demand for labour. It is derived from column space of job advertisements published in 22 major metropolitan area newspapers.[4] The HWI is constructed in such a way that it is difficult to quantify the number of vacancies or the number of job losses during a given period. Researchers have nonetheless attempted to generate a vacancy series from this data [for Canada: Denton, Feaver, and Robb 1975; Betcherman 1986; and Kapsalis 1988; for the United States: Medoff 1983; and Abraham 1987].

The methodology for constructing the index is as follows. First, the column space devoted to job advertisements in any given month is compared with the corresponding figure for the base year in order to construct the raw indices. Second, the raw indices are multiplied by metropolitan area and regional population weights to obtain the appropriate Canadian and regional indices.

In the first step above, the data are collected on one Saturday each month and correspond to the reference week for the Labour Force Survey. However, strikes and delivery problems may result in non-responses. In such cases, the data are imputed from data based on newspapers of previous Saturdays or from previous weeks' or preceding months' newspapers. Excluded from the survey are ads that do not appear in the classified sections of newspapers, ads that appear in the "career" and "opportunity" sections, "position wanted" ads, and newspaper-carrier ads.

A number of factors have a direct influence on the HWI. The size of an ad can vary from newspaper to newspaper. The same employer may place a number of ads in different newspapers. Alternatively, different newspapers have different formats or different layouts for their classified sections. The impact of some of these factors on the HWI has been exhaustively examined for the United States by Abraham [1987], who constructed a modified HWI that takes into account such factors as changes in the occupational composition of employment, advertising practices, and competition in the newspaper industry.

The HWI/JVS Relationship, 1971-78

In the rest of this paper, we use the help-wanted index as a proxy for vacancies and as an indicator of labour demand. First, however, the results

of different tests of the reliability of this procedure are reported. One important question is whether the normalized help-wanted index (NHWI, measured as the help-wanted index divided by non-agricultural employment) is adequate in capturing cyclical variations in job vacancies. For Canada, the job-vacancy rate and the NHWI revealed similar patterns over the period 1971-78. The NHWI showed a somewhat slower response rate, suggesting that this index is less sensitive to cyclical variations. One reason for this may be that employers could send to newspapers a number of ads, each consisting of several job vacancies. These "comprehensive" wanted ads may smooth out some cyclical variations.

A second test was a regression of the log of the normalized help-wanted index on the log of the job-vacancy rate, time, and monthly dummies, using monthly data over the period 1971-78. The estimated coefficient on the log of the vacancy rate was 0.45, with a *t* ratio of 19.8. The coefficient is smaller than 1.0, which confirms that the normalized help-wanted index is less responsive to cyclical variations than is the job-vacancy rate.

Finally, the coefficient of correlation between the normalized help-wanted index and the vacancy rate over the period 1971-78 was found to be 0.64 at the 0.99 level of significance.

These tests suggest, then, that while the NHWI is less responsive to cyclical variations, it can serve as a useful approximation for vacancies and hence for the labour demand situation.

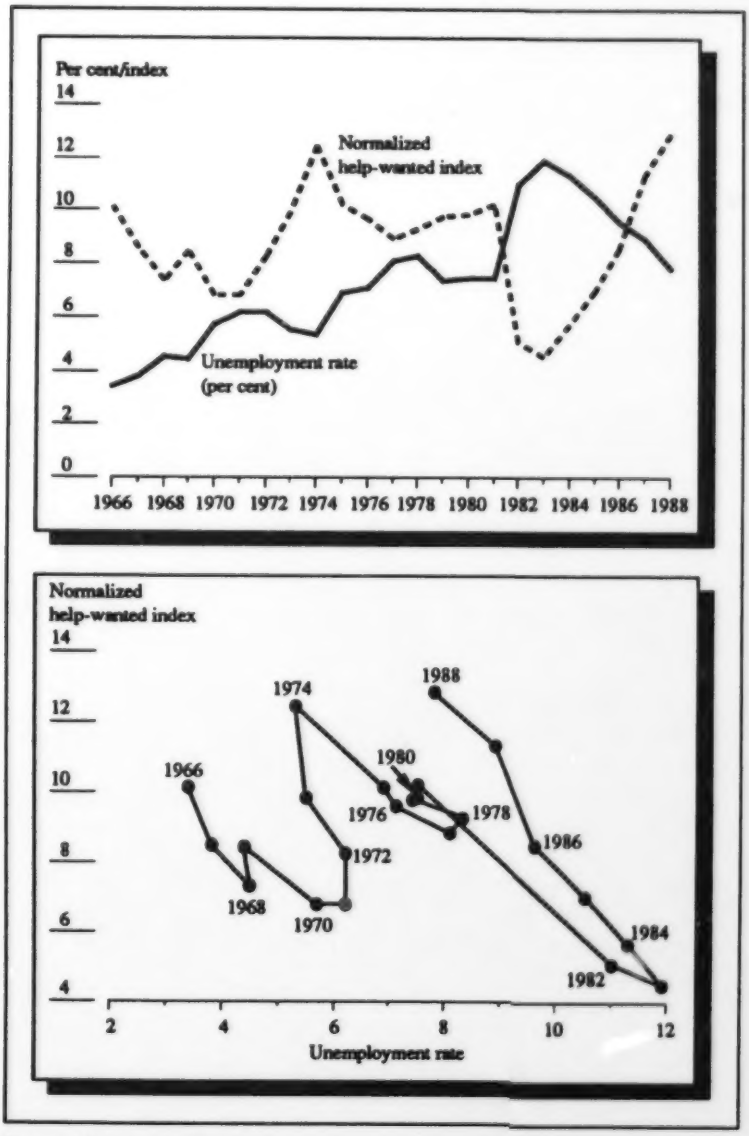
The Unemployment/Normalized Help-Wanted-Index Relationship in Canada, 1966-88

Panel A of Chart 1 shows the cyclical correspondence of unemployment and the normalized help-wanted index. The chart suggests that over course of the cycle, the unemployment rate and the vacancy index, as proxied by NHWI, are mirror images of each other, with vacancies being high and unemployment being low in tight labour markets, while the reverse is true of slack labour markets.

More instructive, however, is the unemployment/NHWI relationship shown in Panel B of Chart 1, where each point refers to a particular year and shows the combination of the vacancy index and unemployment prevailing at that time. A swing of the unemployment/NHWI relationship towards the upper left represents a tightening of labour markets, with more vacancies and lower unemployment; a swing towards the lower right means slack labour markets,

Chart 1

Unemployment/Normalized Help-Wanted-Index Relationship, Canada, 1966-88



Sources Estimates by the authors.

with fewer job vacancies and higher unemployment rates. The evidence in the chart shows an outward shift of the NHWI relative to the aggregate unemployment rate, suggesting that over the course of the last two decades, the Canadian labour market has drifted into a zone characterized by both more unemployment and more vacancies.

To confirm the visual impressions, Table 1 reports estimates of the coefficients from four models designed to capture the shifts in the relationship between the NHWI and the unemployment rate, using annual data for the period 1966-88. All models were estimated by a nonlinear-least-squares procedure to correct for first-order serial correlation.[5] The time-trend coefficient in the first model implies that the aggregate unemployment rate associated with any given NHWI has risen by 5.3 percentage points since 1966. The dummy variable for the period from 1974 on captures an additional shift of 1.2 points, for an estimated total outward shift of 6.5 percentage points since 1966.

The unemployment/NHWI relationship may be affected by the demographic composition of the labour force. It can be argued that the rise in the unemployment rate reflects an increase in the share of groups with high unemployment rates within the labour force. A fixed-weight unemployment rate, defined as a weighted average of group-specific unemployment rates (using 1966 labour force shares as weights), is calculated to test this hypothesis. The fixed-weight unemployment rate quantifies the unemployment rate that would prevail in a given year if each labour force group has its 1966 share of the labour force. The fixed-weight unemployment rate is then used as the dependent variable instead of the actual unemployment rate. The estimated coefficients reported as Model 2 indicate that the fixed-weight unemployment rate associated with any given NHWI has also risen by 6.5 percentage points (including the shift captured by the post-1974 dummy variable).

The time-trend coefficient in Model 3, where NHWI is the dependent variable, indicates that, every year, the NHWI has drifted outward, relative to the unemployment rate, by about 4 per cent (or [0.37/8.78] X 100, where 8.78 is the mean of the NHWI over the sample period). The post-1974 dummy variable captures an additional outward shift of 24 per cent, for an estimated total outward shift of almost 125 per cent since 1966. The coefficients in Model 4 imply about the same total outward shift in NHWI relative to the fixed-weight unemployment rate.

These estimates of the long-term outward shift in the unemployment/NHWI relationship suggest that structural imbalances in Canadian labour markets have become quite significant since 1966.

Table 1

Normalized Help-Wanted Index and Unemployment Rate, Canada, 1966-88[1] (Annual Data)

			Dependent variables			
					Normalized help-wanted index[3]	
	Mean	Standard deviation	Unemployment rate, Model 1	Fixed-weight unemployment rate,[2] Model 2	Model 3	Model 4
Independent variables:						
Constant	...	...	9.24 (7.89)	9.86 (8.62)	15.38 (8.49)	15.70 (8.35)
Normalized help-wanted index (NHWI)	8.78	2.15	–0.68 (2.71)	–0.91 (3.64)	...	...
Normalized help-wanted index squared	81.50	37.63	0.006 (0.45)	0.02 (1.49)	...	...
Unemployment rate	7.33	2.40	...	...	–1.79 (3.31)	...
Unemployment rate squared	59.31	37.22	...	...	0.014 (0.46)	...
Fixed-weight unemployment rate	7.07	2.37	...	...	...	–2.03 (3.51)

Fixed-weight unemployment rate squared	55.40	36.02	...	...	...	0.03 (0.77)
Time trend	12.00	6.78	0.23 (8.51)	0.24 (10.79)	0.37 (5.77)	0.40 (6.41)
Shift dummy (1974 on)	0.65	0.49	1.21 (3.35)	0.98 (3.24)	2.09 (3.63)	1.88 (3.18)
Summary statistics:						
R^2	...	...	0.98	0.98	0.94	0.92
Durbin-Watson	...	...	1.76	1.87	1.79	1.89

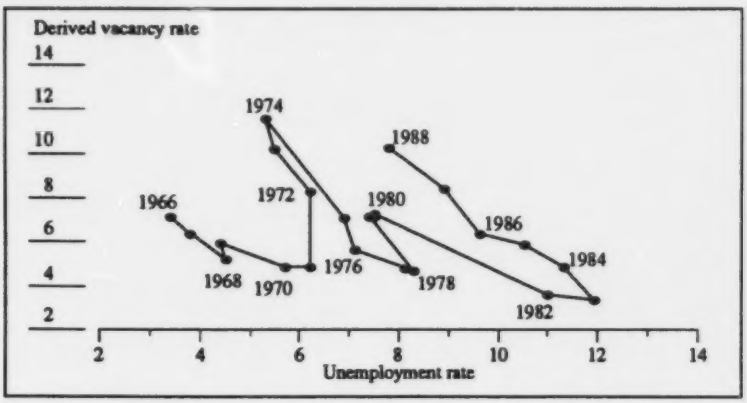
1 All models were fit using the nonlinear-least-squares procedure to correct for first-order serial correlation. The numbers in parentheses are *t*-statistics.
2 Constructed by weighting the unemployment rates for each 12 age/sex groups by the 1966 labour force shares.
3 Obtained by dividing the Statistics Canada help-wanted index by nonagricultural payroll employment (in millions).
Source Estimates by the authors, based on data from Statistics Canada [1988*a*].

The Unemployment/Derived Vacancy-Rate Relationship

This conclusion is further confirmed when the relationship between the unemployment rate and the (derived) vacancy rate is examined. The data on vacancy rates for the period 1966-88 are calculated using Betcherman's [1986] methodology. Two steps are involved in this calculation. First, an empirical relationship is established between the HWI and the JVS data for the period 1971-78. Second, that empirical relationship is used to derive vacancy figures from the HWI for the years 1966-70 and 1979-88. Chart 2 shows the plot of the (derived) vacancy rate and the unemployment rate for 1966-88. The shift in the unemployment/vacancy locus now becomes even more pronounced. The time-trend and post-1974 dummy-variable coefficient estimates reported in Table 2 quantify the magnitude of this shift. In Model 1, the estimates imply an increase of slightly more than 6 percentage points in the unemployment rate associated with any given vacancy rate since 1966. The estimates of the second model imply an increase of about 6.5 percentage points in the fixed-weight unemployment rate associated with any given vacancy rate over the same period. The third model implies a shift of about 190 per cent in the vacancy rate associated with any given unemployment rate over the period; estimates of the fourth model imply the shift is close to 196 per cent. Thus, even when crude vacancy data are used, the estimates indicate a significant outward movement in the unemployment/vacancy relationship since 1966.[6]

Chart 2

Unemployment/Derived Vacancy-Rate Relationship, Canada, 1966-88



SOURCE Estimates by the authors.

Table 2

Derived Vacancy Rate and Unemployment Rate, Canada, 1966-88[1] (Annual Data)

			Dependent variables			
	Mean	Standard deviation	Unemployment rate, Model 1	Fixed-weight unemployment rate,[2] Model 2	Derived vacancy rate[3] Model 3	Derived vacancy rate[3] Model 4
Independent variables:						
Constant	...	...	8.74 (7.26)	8.70 (7.52)	17.72 (5.66)	18.60 (6.31)
Derived vacancy rate	6.58	2.11	–1.00 (3.57)	–1.08 (3.71)	...	...
Derived vacancy rate squared	47.59	31.47	0.037 (1.94)	0.04 (2.15)	...	...
Unemployment rate	7.33	2.40	...	...	–3.37 (3.67)	...
Unemployment rate squared	59.31	37.22	...	...	0.11 (2.15)	...
Fixed-weight unemployment rate	7.07	2.37	...	...	...	–3.79 (4.24)

Table 2 (cont'd.)

	Mean	Standard deviation	Dependent variables: Unemployment rate, Model 1	Fixed-weight unemployment rate,[2] Model 2	Normalized help-wanted index[3] Model 3	Normalized help-wanted index[3] Model 4
Fixed-weight unemployment rate squared	55.40	36.02	...	...	...	0.14 (2.69)
Time trend	12.00	6.78	0.28 (5.58)	0.30 (6.78)	0.53 (4.22)	0.55 (4.79)
Shift dummy (1974 on)	0.65	0.49	–0.47 (0.08)	–0.19 (0.34)	0.45 (0.48)	0.30 (0.33)
Summary statistics:						
R^2	...	...	0.96	0.96	0.83	0.83
Durbin-Watson	...	...	1.48	1.69	1.44	1.60

1 All models were fit using the nonlinear-least-squares procedure to correct for first-order serial correlation. The numbers in parentheses are *t*-statistics.
2 Constructed by weighting the unemployment rates for each 12 age/sex groups by the 1966 labour force shares.
3 Annual vacancy rates were calculated from quarterly vacancy rates, defined as the number of vacancies per 1,000 jobs (employment plus vacancies).
Source Estimates by the authors, based on data from Betcherman [1986]; and from Statistics Canada [1978] and [1988*a*].

The Unemployment/NHWI Relationship by Region

Chart 3 shows that mismatches have also increased within each of five regional labour markets (the Atlantic region, Quebec, Ontario, the Prairie region, and British Columbia) over the period 1966-88. There has been an outward shift in all of the regional curves – a conclusion supported econometrically by the results presented in Table 3. The regional equations were estimated as a five-equation system, using iterative multivariate generalized least squares (in this case, the iterative Zellner estimation technique). The reason for choosing this procedure was that if nonzero correlations between the disturbance terms in regional equations existed, then separate estimation of the regional equations using ordinary least squares would produce inefficient estimates of the regression coefficients [Johnston 1972].

There exists a statistically significant unemployment/NHWI relationship in all regions except the Atlantic. The outward shifts of the curves evident in all the regions are not even. The most severe shift was experienced by the Atlantic provinces, with an increase of 11.7 percentage points in the regional unemployment rate associated with any given regional NHWI since 1966. The Atlantic region was followed by British Columbia, with 8.7 percentage points; Quebec and Ontario, with 7.2 percentage points each; and the Prairies, with 5.3 percentage points.

Model 2 is designed to capture regional growth rates in the NHWI. During the period 1966-88, the estimated NHWI grew by 164 per cent in Ontario; 155 per cent in British Columbia; 152 per cent in the Prairies; 85 per cent in the Atlantic region; and 64 per cent in Quebec. The results show that labour market imbalances grew much more in some regions of Canada than in others.

Why Has the Unemployment/Vacancy Relationship Shifted?

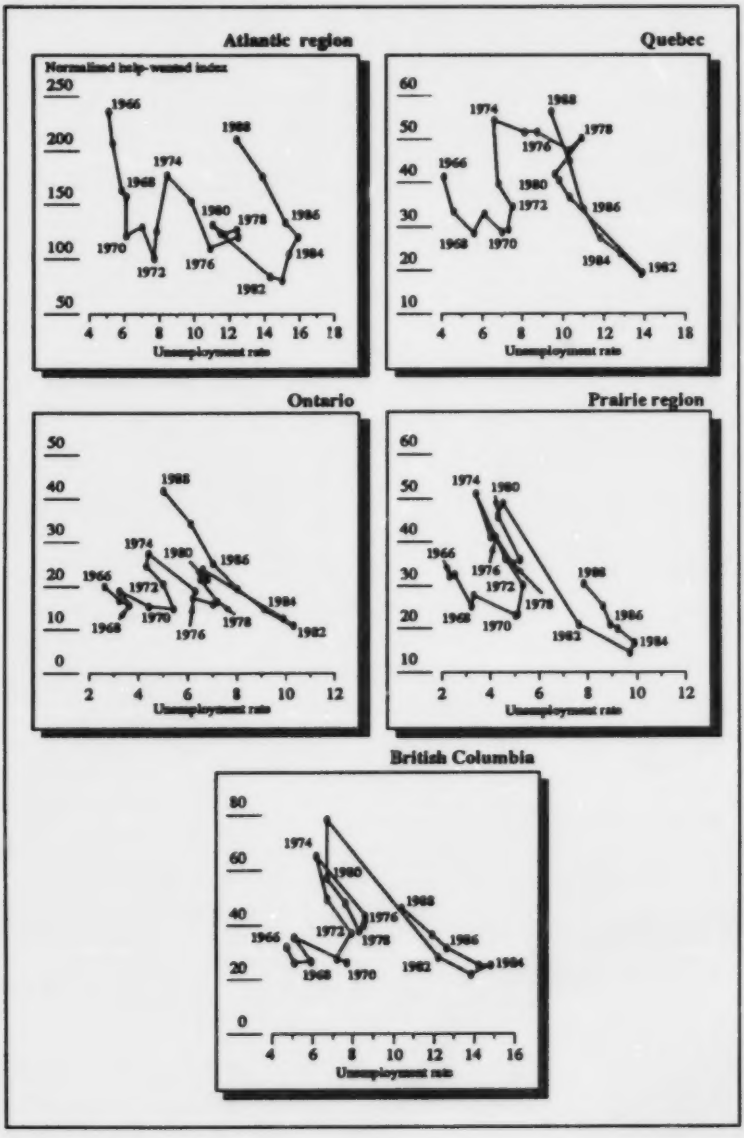
To understand why these shifts have occurred, we must analyse the structural UV relationship. How does the relationship arise? What factors affect it? Here, a simple model is presented that highlights the basic structure of the UV relationship. The model forms the basis for a subsequent discussion of the various factors that cause an outward shift of the UV locus.[7]

A Simplified UV Model

In a labour market, vacancies and unemployment will be related in a manner indicated by the stylized UV curve *AA* in Chart 4. The curve illustrates the process by which unemployed workers and vacancies are matched to generate

Chart 3

Unemployment/Normalized Help-Wanted-Index Relationship, by Region, Canada, 1966-88



Source: Estimates by the authors.

Table 3

Normalized Help-Wanted Index[1] and Unemployment Rate, by Region, Canada, 1966-88[2] (Annual Data)

	Independent variables								
	Regional unemployment rate	(Regional unemployment rate squared)	Normalized help-wanted index	(Normalized help-wanted index squared)	Time trend	Shift dummy (1972 on)	Constant	Summary statistics R^2	
Model 1 (dependent variable: regional unemployment rate)									
Atlantic region	...	...	–0.02	0.0001	0.43	1.81	4.39	0.83	
			(0.81)	(1.57)	(6.06)	(1.67)	(2.27)		
Quebec	...	...	–0.33	0.004	0.25	1.46	11.63	0.86	
			(4.65)	(4.15)	(4.05)	(1.85)	(7.83)		
Ontario	...	...	–0.34	0.002	0.26	1.26	8.06	0.96	Chi-square = 167.22, with 20 degrees of freedom
			(7.06)	(2.02)	(12.34)	(4.18)	(13.42)		
Prairie region	...	...	–0.31	0.002	0.17	1.37	9.55	0.98	
			(7.88)	(4.32)	(9.44)	(5.24)	(14.04)		
British Columbia	...	...	–0.32	0.002	0.27	2.48	12.52	0.96	
			(7.00)	(4.85)	(8.30)	(4.67)	(11.96)		

Table 3 (cont'd.)

	Independent variables								
	Regional unemployment rate	(Regional unemployment rate squared)	Normalized help-wanted index	(Normalized help-wanted index squared)	Time trend	Shift dummy (1972 on)	Constant	Summary statistics R^2	
Model 2 (dependent variable: normalized help-wanted index)									
Atlantic region	-77.14	3.06	...	...	3.54	38.21	504.82	0.22	
	(8.98)	(9.08)			(1.90)	(1.42)	(12.47)		
Quebec	4.38	0.30	...	...	0.41	14.68	18.96	0.49	
	(2.15)	(3.15)			(1.02)	(2.56)	(2.14)		
Ontario	-9.48	0.40	...	...	1.16	6.90	42.49	0.91	Chi-square = 188.61, with 20 degrees of freedom
	(13.70)	(8.32)			(10.87)	(4.32)	(20.52)		
Prairie region	-17.89	0.79	...	...	1.57	11.91	74.87	0.87	
	(15.27)	(8.30)			(6.64)	(3.84)	(21.86)		
British Columbia	-15.87	0.48	...	...	1.63	22.70	99.82	0.83	
	(5.37)	(3.43)			(4.37)	(5.13)	(8.02)		

1 Obtained by dividing the Statistics Canada regional help-wanted indices by nonagricultural payroll employment (in millions).

2 Both models were estimated using iterative multivariate estimates generalized least squares (or iterative Zellner estimation). The numbers in parentheses are *t*-statistics.

Source Estimates by the authors, based on data from Statistics Canada [1988*a*] and [1988*b*].

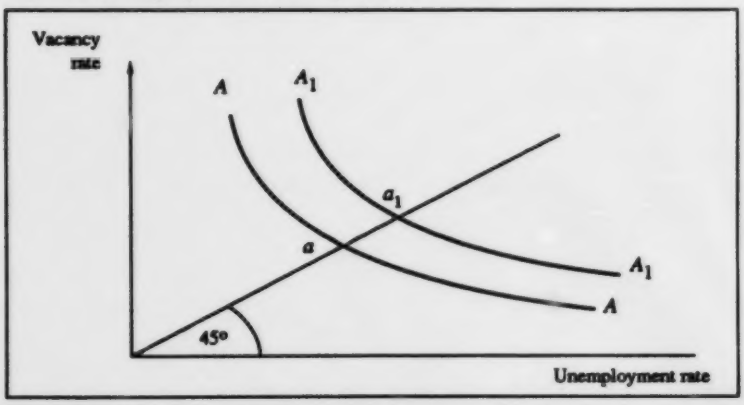
a flow of hirings. It is based on the assertion that increases in the number of hirings are positively related to the number of unemployed people looking for work in any given period and to the number of vacancies that firms are willing to fill during the same period. If vacancies increase at a given unemployment rate, the number of hirings increase as the process of job matching becomes easier. In other words, the higher the number of vacancies, the higher the flows out of unemployment and the lower the unemployment rate. Thus there is an inverse relationship between vacancies and unemployment. Alternatively, any increase in the mismatch between unemployment and vacancies will reduce hirings and lower the flows out of unemployment.

The intensity with which firms want to fill vacancies will depend upon how they view the quality of the unemployed individuals and on institutional factors in the labour market, such as employment protection laws, the presence of unions, and minimum wages. Let g be the proportion of vacancies that firms wish to fill in any given period. Similarly, unemployed persons may differ in the intensity of their job search, which will be conditioned by their past unemployment experience and by the level of unemployment insurance benefits. Let c be the proportion of the unemployed who are effectively searching for jobs per period. The matching or outflow equation then can be described as,

$$A_t = f(gV_t, cU_t, mm), \tag{1}$$

Chart 4

Stylized Unemployment/Vacancy Curve



where A is the number of unemployed leaving unemployment in any given period, and V and U are the numbers of vacancies and of unemployed people.[8]

A fall in g arising, for example, because employers become more choosy in hiring the unemployed will reduce "effective vacancies" and reduce the outflow from unemployment. Similarly, a fall in search intensity will reduce the outflow rate from unemployment.

The inflow into unemployment in any given period (I_t) is

$$I_t = I_{1t} + I_{2t}, \tag{2}$$

where I_{1t} are inflows into unemployment consisting of new entrants and/or re-entrants into the labour market, and I_{2t} are inflows into unemployment from employment during period t. I_{2t} can also be expressed as $I_{2t} = s_t N_t$, where N_t is total employment and s_t is the rate at which employed people leave their jobs in period t. Equation 2 then becomes

$$I_t = I_{1t} + s_t N_t. \tag{3}$$

In steady-state equilibrium, the outflow from unemployment equals the inflow – i.e., $A_t = I_t$. This gives

$$f(gV_t, cU_t, mm) - (I_{1t} + s_t N_t) = 0. \tag{4}$$

Equation 4 gives the long-run UV curve.[9] From this equation we can deduce five possible explanations as to why an outward shift in the UV relationship occurs. The shift can occur if any of the following conditions is realized: 1) the inflow into unemployment (I_t), consisting of new entrants and re-entrants, rises; 2) the turnover rate (s_t) rises; 3) employers become more selective in their hirings – i.e., the proportion of vacancies that employers are willing to fill in any given period falls; 4) a fall in c, caused by a decline in the search intensity of unemployed job seekers; or 5) if mismatches between unemployment and vacancies increase. In principle, mismatch can have a number of dimensions. In Canada, the most frequently considered dimensions are regional and industrial. The aggregate UV relationship may be affected by changes in both the positions of the unemployment/vacancy loci in regional labour markets and the distribution of labour demand across regions and industrial sectors.

Inflows into Unemployment and the UV Curve

An increase in the rate of growth of the labour force could increase *net inflow into unemployment* and thus cause an outward shift in the

unemployment/vacancy relationship. While it is true that female participation rates have risen steadily in Canada – from 35.4 per cent in 1966 to 57.4 per cent in 1988 – the growth in the labour force in recent years (averaging 3.2 per cent per annum over the period 1970-79) has not been markedly faster than in the 1960s. In fact, the average annual growth rate of the labour force has declined (to 1.8 per cent) over the period 1980-88. If growth in the labour force were the only factor affecting the UV locus, the latter should have begun to shift inward in the early 1980s.

Exogenous *increases in the turnover rate* (s_t) could raise both vacancies and unemployment. The evidence on turnover rates in Canada is presented in Table 4. The data suggest that turnover rates have not increased over time. The quit rates have also declined in recent years. Increases in the quit rate can be caused by an increased share of young people and women in the labour force. While there is evidence that the quit rates of young workers are higher than those of older workers, the share of youth in the labour force (aged 15 to 24) has begun to decline – from a 1974 peak of 27.2 per cent to 20.4 per cent in 1988. The combined proportion of youth and women in the labour force rose steadily until the early 1980s, but that proportion has remained fairly constant since then, as the increasing proportion of women

Table 4

Permanent and Temporary Job-Separation Rates, Canada, 1978-86

	Permanent[1]			Temporary[2]	
	Layoffs	Quits	Total	Layoffs	Total
			(Per cent)		
1978	7.4	7.5	21.3	9.0	16.3
1979	6.6	8.7	22.3	8.4	16.0
1980	6.1	8.2	21.2	8.8	16.5
1981	6.7	8.9	22.5	9.8	17.2
1982	8.5	5.6	20.6	12.7	20.9
1983	7.7	5.0	18.7	10.8	17.5
1984	7.9	6.3	21.1	10.9	18.7
1985	7.2	7.3	21.6	10.2	18.0
1986	6.9	7.7	21.3	9.6	17.0

1 Defined as permanent separations from firms, as a proportion of person-jobs. A person-job is a person working for a firm during a year. One person may work for two or more firms and thus contribute two or more person-jobs. The total column is not the sum of layoffs and quits because it also includes "other" reasons for separation.

2 Defined as temporary separations from firms, as a proportion of persons employed.

Source Picot and Baldwin [1990].

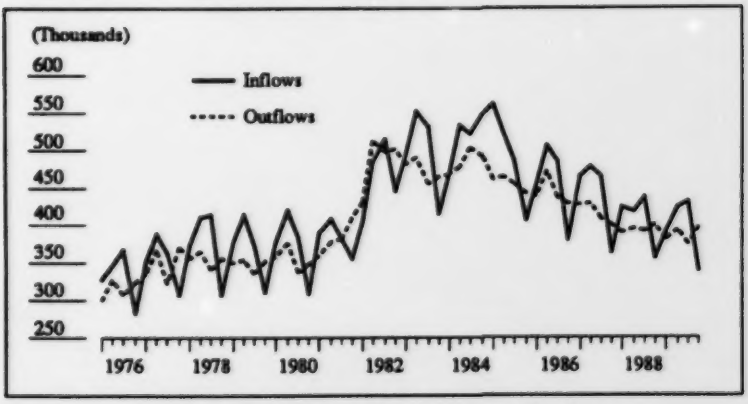
has largely been offset by the decline in the share of young workers. The latter can, therefore, be ruled out as a possible factor in the outward shift of the UV relationship.

Another possible explanation for the shift in the UV relationship is the change in the demographic composition of the labour force. To the extent that particular demographic groups, such as youth and women, differ in the *intensity of job search* while unemployed, changes in labour force composition may affect both the search behaviour of unemployed workers and the turnover rate – and, in turn, the unemployment rate. One way to examine this effect is to calculate a fixed-weight unemployment rate as a weighted average of group-specific unemployment rates.[10] The findings reported in Model 2 of Tables 1 and 2 indicate that the estimated shift in the UV locus, using a fixed-weight unemployment rate, has been about the same as that using the measured unemployment rate. Thus the changing demographic composition of the labour force does not seem to play a significant role in explaining the shift of the UV locus.

The preceding discussion suggests that inflows into unemployment did not contribute to the shift of the UV curve. This conclusion is also borne out by an examination of the overall inflow into, and outflow rates from, unemployment. Chart 5 plots the quarterly averages of monthly inflows and outflows from unemployment for the period 1976-89. Inflows into unemployment have been declining since the early 1980s. At the same time, outflows have also been declining. Rahman and Gera [1990], in an analysis

Chart 5

Unemployment Inflows and Outflows, Canada, 1976-89



Source: Based on Statistics Canada's Labour Force Survey gross-flow data.

of rates of flow into and out of unemployment, found that while both rates increased during the 1981-82 recession, the persistence in unemployment in the 1980s has been due mainly to a decrease in the outflow rate.[11]

Outflows from Unemployment and the UV Curve

Outflows from unemployment are affected by the proportion of vacancies (g) that employers are willing to fill in any given period, the search intensity of the unemployed job seekers (c), and the mismatches between the unemployed and the vacancies. These factors, in turn, depend on institutional considerations, such as the existence of unemployment insurance benefits, employment protection laws, unions, and minimum wages. In addition, the presence of long-term unemployment can reduce both g and c. Here, we discuss each of these considerations in turn, concluding the section with a discussion of mismatches in the Canadian labour market. The major emphasis is on evaluating the impacts of long-term unemployment and of the mismatches.

Unemployment Insurance Benefits

The generosity of the unemployment insurance (UI) system can shift the UV curve for a number of reasons. Basically, it affects the search behaviour of the unemployed. By lowering the cost of job search, it encourages unemployed workers to extend the duration of their search and perhaps to hold out for better jobs [Hasan and Gera 1982]. It may also lower their search intensity. Since the Canadian UI system is not experience-rated, it subsidizes firms and workers with unstable employment patterns. The evidence shows that under a generous UI system, employers become less reluctant to lay off workers, and workers are more likely to wait for a recall to their old job than to search for a new one. Moreover, individuals with marginal labour-force attachment are encouraged to enter the job market with the expectation that they will have to work only a minimal amount of time so as to be entitled to receive UI benefits.

The Canadian UI system has undergone considerable changes over the past two decades. The generosity of the system increased substantially as a result of changes to the Unemployment Insurance Act in 1971. That year, the qualification period was shortened from 30 weeks of paid work in the previous two years to 8 weeks; benefits were increased, particularly in economically depressed regions; and the coverage was extended to include most of the unemployed who were not self-employed (e.g., workers on maternity leave, seasonal workers, etc.). However, the 1976 and 1979 revisions to the act reduced the generosity of the system by lengthening the qualification period

for entitlement, decreasing the duration of benefits, and lowering the benefit rate. Nevertheless, in its current form, the system is still more generous than it was prior to 1971.

Three basic measures of the generosity of the UI system are examined here: the percentage of the labour force covered by the UI system (UICOV); the replacement rate, or the ratio of UI benefits to wages (UIREPL); and the ratio between the maximum number of weeks of benefits allowed and the minimum number of weeks of work required to qualify for benefits (UIMIN).[12]

Our results show that, on balance, the system is only slightly more generous today than it was before 1971, though the intervening period did see, first, a substantial increase in generosity, followed by a reduction. The aspect of the system that changed the least was the percentage of the labour force covered by the UI system. The replacement ratio did change through time, rising in 1971 from 50 to 70 per cent of wages; the 1979 amendments to the act lowered the ratio to 60 per cent. The most substantial changes took place with respect to the ratio between the maximum number of weeks of benefits allowed and the minimum number of weeks of work required to qualify. During the period 1966-71, 8 weeks of work entitled unemployed workers to 4 weeks of benefits. The 1971 revisions resulted in 8 weeks of work giving rise to 30 weeks of benefits (or more in some regions). Beginning in 1978, however, the work requirements for 30 weeks of benefits were raised to between 10 and 14 weeks, depending on the regional unemployment rate.

On balance, the evidence suggests that the UI system became less generous during the 1980s compared with the mid-1970s and that, as a result, it should have led to a reduction in the length of job search and to an increase in the search intensity of the unemployed. The unemployment/vacancy relationship should therefore have shifted inward, not outward as it did in fact.[13]

Employment Protection Laws

An equally important factor affecting flows both into and out of unemployment is the presence of employment protection laws. If these laws increase the expected cost of firing workers, employers will become more selective in the initial hiring decision. Thus the proportion of vacancies they are willing to fill in any given period will fall. At the same time, employment protection legislation should decrease the number of firings in the economy. Thus the net effect of these laws on the UV curve depends on which of these effects dominate. In Canada, there is no evidence on the net effect of federal and provincial employment laws on the unemployment rate. Nevertheless, we doubt that structural unemployment in Canada has risen in recent years because of changes in employment protection laws.[14]

Minimum Wages

Minimum-wage requirements can drive a wedge between productivity and wages. This wedge can lead to a decline in the proportion of the vacancies the employers are willing to fill. In Canada, the minimum wage rose relative to the average industrial wage over the period 1963-75 and, presumably, relative to productivity as well [Burns 1990]. Since 1976, however, that relationship has reversed itself and the minimum wage has fallen relative to the average industrial wage. As a result of this factor, the unemployment rate may have been lowered more than it would otherwise have been in the late 1970s and the 1980s: estimates suggest that the decline in the minimum wage contributed to a 3-percentage-point drop in the natural rate of unemployment between 1975 and 1987.

Unions

It has been argued that unions can significantly increase the natural rate of unemployment. For example, Daly and MacCharles [1986] and Grubel and Bonnici [1986] contend that, in Canada, the natural rate has increased because of the high real wages generated and protected by powerful unions. According to this view, the unionized sector was able to realize unwarranted real-wage gains in the 1970s that are now a relatively permanent feature of our cost structure. The real wage gains followed a period characterized by favourable price shocks and misplaced expectations of firms. However, the relatively permanent nature of the gains may have exacerbated structural unemployment in Canadian labour markets.

Summers [1986] has similarly argued that a significant part of the increase in the equilibrium rate of unemployment in the United States during the 1970s can be attributed to the influence of unions. Using 1985 cross-section data by state, he estimated that a 10-per-cent increase in a state's unionization rate causes a 1.2-percentage-point rise in equilibrium unemployment. Blanchard and Summers [1986] have argued that recessionary shocks have caused unemployment to persist in many European countries, owing in part to their strong unions.

For unions to exert a significant influence on the wage-setting process and hence on the equilibrium unemployment rate, it is essential for them to have sufficient power. For them to exert increasing influence, it is also essential that their power increase. In Canada, the union coverage ratio – the ratio of union membership to total nonagricultural employment – rose by some 4 or 5 percentage points during the 1970s. However, the ratio remained relatively constant during the 1980s. Thus it seems unlikely that unions contributed to increased unemployment rates in the 1980s [Ashenfelter and Card 1986; Moorthy 1989-90; and Bruce 1990].

Long-Term Unemployment

An increasing share of long-term unemployment in total unemployment could lower the outflow rate from unemployment and cause an outward shift in the UV curve. The impact of long-term unemployment on the UV curve operates primarily through two sources – the proportion of vacancies the firms wish to fill in a given time period (g) and the proportion of the unemployed workers (c) actively seeking employment in the current period. Both g and c could decrease as the proportion of long-term unemployment increases.

In spite of strong economic growth and employment creation during the 1980s, the incidence of long-term unemployment in Canada has remained unusually high [Rahman and Gera 1990]. Even in 1989, when the unemployment rate had returned to its 1981 level, the proportion of the labour force that had been continuously unemployed for a year or more was one and a half times greater than in 1981. The incidence of long-term unemployment reached a high of 10.1 per cent in 1985; since then it has been declining, reaching 6.6 per cent in 1989.[15]

The probability of finding a job decreases the longer a person is out of work [Hasan and de Broucker 1985]. In Rahman and Gera [1990], it is shown that the exit probabilities of the short- and long-term unemployed have diverged considerably since 1977, when they were almost the same. For both groups, the exit probabilities declined sharply during the recession. However, while the prospect of exiting from unemployment for the short-term unemployed has now nearly returned to its pre-recession level, that is not the case for the long-term unemployed.

Why does the probability of leaving unemployment fall as duration increases? Budd, Levine, and Smith [1987] have made the following argument in attempting to answer that question. Consider a given cohort of unemployed workers who have all been unemployed for the same length of time. Those workers with the most desirable labour-market characteristics will have the highest probability of being hired in a given time period. This leaves workers with less desirable characteristics unemployed. In the next period, those workers who were unemployed the previous period and failed to get hired are still unemployed, but they have now been so for an additional period. Moreover, there will be a fresh crop of newly unemployed individuals. Again, those who find jobs most easily are those with the most desirable skills. As this process continues, those workers who do not find employment increasingly consist of individuals with relatively undesirable characteristics.

Two possibilities may then occur. Employers may use the duration of unemployment as a screening device when hiring, in the belief that it is an indicator of a potential employee's human capital and other characteristics.

Alternatively, the search intensity of individuals may decline with the duration of unemployment, because of a deterioration in their human capital. As the worker's inability to find work is prolonged, his/her work skills may deteriorate through lack of use; even more important, there may be adverse psychological effects, such as depression, discouragement, and alienation, all of which reinforce the effects of skill disuse. This is often referred to as the process of "scarring." Both or either of these factors can lead to a decline in the probability of leaving unemployment for the long-term unemployed.

Although the deterioration-of-human-capital argument can explain why search intensities may be lower for the long-term unemployed, it does not explain a priori why the average search intensity of the unemployed declines, thus producing an outward shift of the UV curve.

The impact, on the average search intensity, of a decline in the search intensity of the long-term unemployed can be illustrated as follows [Budd, Levine, and Smith 1987]. Suppose that unemployed individuals are divided into cohorts according to their labour market characteristics, indexed by i. Let U_i^{ST} be the cohort of unemployed workers of type i at time t who have experienced short-term unemployment. Let C_i^{ST} be the search intensity of the members of this cohort. C^{ST}, given by the following expression,

$$C^{ST} = \frac{\sum_i C_i^{ST} U_i^{ST}}{\sum_i U_i^{ST}}, \tag{5}$$

is the average search intensity for the short-term unemployed. Let C_i^{LT} be the average search intensity of the long-term unemployed and R_i^{LT} denote the ratio of long-term to total unemployment of group i. The average search intensity is given by the weighted sum of the search intensities of each group i,

$$C = \sum_i C_i^{ST} (1 - R_i^{LT}) \frac{U_i}{U} + \sum_i C_i^{LT} R_i^{LT} \frac{U_i}{U}. \tag{6}$$

If $C_i^{LT} < C_i^{ST}$, then

$$\frac{\partial C}{\partial R_i^{LT}} = (C_i^{LT} - C_i^{ST}) \frac{U_i}{U} < 0. \tag{7}$$

Thus, if the duration of unemployment causes the search intensities of individual groups to fall, it will also be the case that average search intensity

will fall. While this last statement is true, it does not by itself imply that the UV curve will shift outward. The reason is that prolonged unemployment may lead to some unemployed individuals choosing to exit the labour force. In terms of our inflow/outflow equation 4, this means that there will be a positive correlation between outflows from unemployment into the cohort "not in the labour force" and the duration of unemployment. If this effect, sometimes referred to as the "retirement" effect, were to dominate the effect of long-term unemployment on average search intensity (and the hiring decisions of firms), then it is entirely possible that an increase in long-term unemployment could lead to an inward shift of the UV curve. Whether the curve shifts inward or outward in response to an increase in long-term unemployment depends on whether the retirement effect or the search-intensity effect dominates.

Long-Term Unemployment and the UV Curve: Evidence

The next step is to test directly whether the outward shift of the UV curve can be explained by a rise in the share of long-term unemployment. A long-term unemployment variable – the proportion of the long-term unemployed in the total number of unemployed – was introduced as an independent variable into equations 1 and 2 to find whether increases in this type of unemployment cause shifts in the UV curves. Long-term unemployment was defined to be continuous unemployment for 53 weeks or more. The equations were estimated on a quarterly basis for the period from the first quarter of 1976 to the final quarter of 1988; this period was selected because 1) data on long-term unemployment were not available prior to 1976, and 2) the quarterly estimations provided sufficient degrees of freedom. The results of the national equations are reported in Table 5 (Models 6 and 7) and Table 6 (Models 4 and 5).

As can be seen, the long-term unemployment variable is highly significant in the UV curve equations. The coefficient of the time variable indicates a total outward shift of 4.06 percentage points in the rate of unemployment over the estimation period, while long-term unemployment has contributed to an increase in total unemployment of about 2.3 percentage points since 1976. That result is important. It establishes that a rise in the incidence of long-term unemployment impairs the functioning of the labour market through both a reduction in the intensity of job search and a reluctance on the part of employers to hire the long-term unemployed. However, the higher estimate of the total shift indicates that factors other than long-term unemployment were responsible for shifting the UV curve.

The regional UV-curve equations were also estimated on a quarterly basis for the same period. The results are reported in Table 7 (Models 4 and 5).

Table 5

Normalized Help-Wanted Index and Unemployment Rate, Canada, 1976-88[1] (Quarterly Data)

Dependent variable: national unemployment rate

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Independent variables:							
Normalized help-wanted index (NHWI)	0.41 (3.35)	...	0.28 (2.44)	2.14 (2.48)	0.29 (2.52)	0.24 (2.37)	0.25 (2.38)
$NHWI_{-1}$	...	–0.35 (3.85)	–0.31 (3.62)	...	–0.32 (3.70)	–0.29 (3.69)	–0.29 (3.69)
NHWI squared	...	...	...	–0.11 (2.13)	...	...	...
Industrial dispersion	...	...	...	...	0.21 (0.67)	...	0.08 (0.27)
Long-term unemployment	...	...	...	...	...	0.54 (3.65)	0.54 (3.58)
Time	0.049 (1.40)	0.08 (1.75)	0.05 (0.88)	0.02 (0.41)	0.05 (0.88)	–0.03 (0.65)	–0.03 (0.63)
Constant	3.68 (2.47)	9.46 (6.70)	7.52 (4.29)	–1.78 (0.45)	7.46 (4.26)	6.44 (5.02)	6.43 (5.01)

Table 5 (cont'd.)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Summary statistics:							
R^2	0.83	0.77	0.80	0.77	0.80	0.84	0.84
Durbin-Watson	1.67	1.62	1.69	1.73	1.71	1.60	1.60

1 All models were fit using the nonlinear-least-squares procedure to correct for first-order serial correlation. The numbers in parentheses are *t*-statistics.
SOURCE Estimates by the authors, based on data from Statistics Canada [1988*a*].

Table 6

Derived Vacancy Rates and Unemployment Rate, Canada, 1976-88[1] (Quarterly Data)

Dependent variable: national unemployment rate

	Model 1	Model 2	Model 3	Model 4	Model 5
Independent variables:					
Derived vacancy rate (V)	–0.77 (14.16)	–1.56 (6.97)	–0.76 (14.46)	–0.65 (8.57)	–0.67 (9.23)
Derived vacancy rate squared	...	0.06 (3.59)	...	...	...
Industrial dispersion	...	...	0.50 (1.18)	...	0.34 (0.82)
Long-term unemployment	...	...	...	0.18 (1.89)	0.15 (1.68)
Time trend	0.08 (11.53)	0.08 (11.29)	0.08 (12.43)	0.05 (2.48)	0.05 (2.94)
Constant	11.41 (34.54)	13.90 (18.67)	11.34 (34.58)	10.53 (19.43)	10.64 (20.65)
Summary statistics:					
R^2	0.82	0.85	0.82	0.83	0.83
Durbin-Watson	1.93	2.00	1.93	1.90	1.91

1 All models were fit using the nonlinear-least-squares procedure to correct for first-order serial correlation. The numbers in parentheses are *t*-statistics.

SOURCE Estimates by the authors, based on data from Betcherman [1986]; and from Statistics Canada [1978] and [1988*a*].

The national long-term unemployment variable was used for the Atlantic and Prairie regions, because of the lack of a consistent time series with respect to the proportions of the long-term unemployment variable for these regions. Long-term unemployment was found to be a significant explanatory variable in those two regions, as well as in British Columbia. The results show, for example, that of the estimated shift of 5.2 percentage points in the

Table 7

Normalized Help-Wanted Index and Unemployment Rate, by Region, Canada, 1976-88[1] (Quarterly Data)

Dependent variable: regional unemployment rate

	Normalized help-wanted index (NHWI)	NHWI squared	Time trend	Industrial dispersion	Long-term unemployment[2]	Constant	R^2	
Model 1								
Atlantic region	0.001 (0.34)	...	0.07 (4.20)	...	...	11.23 (16.99)	0.26	Chi-square = 146.25, with 10 degrees of freedom
Quebec	–0.05 (5.37)	...	0.02 (1.32)	...	...	12.56 (21.60)	0.44	
Ontario	–0.10 (4.84)	...	0.06 (3.79)	...	...	7.40 (15.11)	0.44	
Prairie region	–0.06 (7.40)	...	0.09 (8.35)	...	...	6.29 (13.53)	0.79	
British Columbia	–0.07 (8.32)	...	0.10 (6.80)	...	...	10.55 (17.74)	0.72	
Model 2								
Atlantic region	0.03 (1.67)	–0.0002 (2.26)	0.09 (5.57)	...	...	9.61 (6.92)	0.39	Chi-square = 183.54, with 15 degrees of freedom
Quebec	–0.24 (5.55)	0.002 (3.86)	0.01 (0.99)	...	...	16.29 (18.98)	0.63	

Ontario	–0.30 (3.96)	0.003 (2.13)	0.06 (4.64)	...	...	9.78 (10.34)	0.58	
Prairie region	–0.16 (4.75)	0.001 (2.68)	0.08 (8.33)	...	...	8.22 (12.05)	0.84	
British Columbia	–0.22 (6.78)	0.001 (4.46)	0.09 (7.13)	...	...	14.39 (15.78)	0.82	
Model 3								
Atlantic region	–0.00002 (0.004)	...	0.08 (4.57)	12.63 (1.21)	...	10.61 (11.75)	0.31	Chi-square = 152.69, with 10 degrees of freedom
Quebec	–0.05 (5.39)	...	0.02 (1.23)	–19.29 (2.67)	...	13.06 (21.39)	0.44	
Ontario	–0.10 (7.19)	...	0.06 (4.01)	–1.24 (0.09)	...	7.53 (14.07)	0.46	
Prairie region	–0.06 (5.35)	...	0.09 (8.26)	–0.74 (0.83)	...	6.27 (13.29)	0.79	
British Columbia	–0.07 (7.90)	...	0.10 (6.63)	–3.01 (0.51)	...	10.60 (16.16)	0.72	
Model 4								
Atlantic region	–0.002 (0.35)	...	–0.003 (0.12)	...	0.46 (4.35)	10.71 (15.34)	0.55	Chi-square = 190.30, with 15 degrees of freedom
Quebec	–0.07 (6.82)	...	0.002 (0.10)	...	0.04 (0.71)	13.19 (21.57)	0.54	
Ontario	–0.15 (6.51)	...	0.08 (4.40)	...	–0.07 (0.69)	8.29 (13.26)	0.55	

Table 7 (cont'd.)

	Normalized help-wanted index (NHWI)	NHWI squared	Time trend	Industrial dispersion	Long-term unemployment[2]	Constant	R^2	
Prairie region	–0.06 (7.39)	...	0.03 (2.63)	...	0.38 (6.82)	5.46 (12.16)	0.90	
British Columbia	–0.08 (9.13)	...	0.05 (3.18)	...	0.26 (5.77)	10.46 (18.76)	0.83	
Model 5								
Atlantic region	–0.03 (0.60)	...	0.006 (0.27)	17.11 (1.64)	0.44 (4.34)	9.80 (10.97)	0.58	Chi-square = 201.97, with 20 degrees of freedom
Quebec	–0.07 (6.86)	...	0.001 (0.06)	–21.53 (2.80)	0.04 (0.72)	13.72 (21.96)	0.52	
Ontario	–0.16 (6.97)	...	0.09 (4.75)	–9.01 (0.65)	–0.10 (1.00)	8.61 (12.92)	0.56	
Prairie region	–0.06 (7.40)	...	0.03 (2.63)	–0.79 (0.99)	0.38 (6.85)	5.51 (12.28)	0.90	
British Columbia	–0.08 (9.14)	...	0.05 (3.15)	1.48 (0.23)	0.26 (5.79)	10.56 (16.88)	0.83	

1 All models were estimated using iterative multivariate estimated generalized least squares. Numbers in parentheses are *t*-statistics.
2 Long-term unemployment is defined as the proportion of the number of long-term unemployed to the total number of unemployed in each year.
Source Estimates by the authors, based on data from Statistics Canada [1988*a*] and [1988*b*].

British Columbia UV curve during the period from the first quarter of 1976 to the final quarter of 1987 (Model 5, Table 7), about 1.7 percentage points were due to increases in long-term unemployment. However, the variable was not significant in explaining shifts in the UV curve for Ontario and Quebec. One may therefore plausibly argue that the relatively greater improvements in the economic performance of these two regions relative to the others during the recent expansionary phase may have offset the impact of long-term unemployment on the unemployment rate.[16]

The significance of the long-term unemployment variable in explaining the shifts in the national and some of the regional UV curves is symptomatic of the presence of hysteresis, or of the persistence in unemployment in Canada. According to the hysteresis hypothesis [Sachs 1986; Blanchard and Summers 1986; Lindbeck and Snower 1988; and Heap-Hargreaves 1980], the natural rate of unemployment is variable, being a function of the path of past unemployment rates. The latter, in turn, are affected by the presence of long-term unemployment. For example, the declining exit probabilities of the long-term unemployed will impinge on the natural rate by exacerbating structural imbalances [King 1990].

Two major explanations – the depreciation of human capital and the "insider/outsider" wage bargaining – have been offered to explain why unemployment may exhibit hysteresis or persistence.

As argued before, the deterioration of human capital caused by long-term unemployment leads to reduced search intensity on the part of its victims and/or to a reluctance on the part of employers to hire these individuals. In the "insider/outsider" hypothesis, hysteresis is viewed as a characteristic of a wage-bargaining process where employed workers (insiders) bargain for higher wages while still preserving their jobs. That argument has also been made in examining the influence of unions on unemployment. Unionized workers are often seen as "insiders" and nonunionized workers as "outsiders." When the employed union insiders are insulated from the unemployed nonunion outsiders, wages do not decelerate in the face of high unemployment. This leads to a persistence of high unemployment.

The results presented here with respect to long-term unemployment are consistent with the human-capital argument for hysteresis. They may also be consistent with the insider/outsider argument. In Rahman and Gera [1990], we found that the long-term unemployed exerted no influence on aggregate wage growth over the period 1977-87. The short-term unemployed, on the other hand, were found to have exerted significant pressure on wage growth. In this sense, the long-term unemployed could be treated as outsiders in the wage-bargaining process.

Mismatches and the UV Curve

The Regional Dimension

Considerable variations are apparent in regional labour-market performances in Canada. For example, unemployment rates in 1989 ranged from 5.1 per cent in Ontario to over 12 per cent in the Atlantic region. The Prairies had unemployment rates close to the national average of 7.5 per cent, whereas British Columbia and Quebec had rates above the national average. The purpose of this section is to inquire whether the variations in those regional performances affect the national UV curve.

Regional labour-market performances can affect the magnitude of mismatching in the national labour market in two ways. First, there may be an increase in the severity of intraregional problems. If rigidities and mismatching worsen *within* all regional labour markets, then the national picture will deteriorate, too. Second, an increase in the disparities in labour market performance *across* regions – interregional dispersion – will also increase the national level of mismatching.

Total intraregional effects are best understood as the sum of the effects from within each particular region that cause each individual regional UV curve to shift. However, a shift of the UV curve for, say, Quebec will also have strong effects on the UV curve for, say, Ontario, as well as on other regional curves. Factors such as the mobility of labour in response to differential levels of unemployment compensation, employment growth, imperfectly correlated shocks across regions, or differential responses of regional economies to external shocks will lead to strong links among the various regional labour markets.

These "spillovers" from one region into another are not included in the intraregional effects. But they must be taken into account when computing the total shift of the national curve. Indeed, given the possibility of strong linkages between the various regional labour markets, it is quite likely that these interregional effects are substantial.

Let the UV curve for region i be written as:

$$U_i = b_{0i} + b_{1i}V_i + b_{2i}T + e_i, \tag{8}$$

where U is the unemployment rate, V is the vacancy rate, and T is the time trend. Aggregating across regions yields,

$$\sum_{i=1}^{5} a_i U_i = \sum_{i=1}^{5} b_{0i} a_i + \sum_{i=1}^{5} b_{1i} a_i V_i + \sum_{i=1}^{5} b_{2i} a_i T + \sum_{i=1}^{5} a_i e_i, \tag{9}$$

where a_{it} is the share of region i in the total national labour force at time t. The expression for the national UV curve is then arrived at by summing the curves for all the regions:

$$U_t = \sum_{i=1}^{5} b_{0i} a_{it} + \sum_{i=1}^{5} b_{1i} a_{it} V_{it} + \sum_{i=1}^{5} b_{2i} a_{it} T + \sum_{i=1}^{5} a_{it} e_{it}. \qquad (10)$$

Equation 10 incorporates all the information of the more cumbersome five-equation system (reported in Table 3), but it is difficult to interpret as a structural model. However, the equation provides us with an estimate of the shift caused by intraregional factors.

The process followed here to separate intra- and interregional effects can be illustrated with two simple exercises. In the first, we estimate the regional curves.

Suppose that it is found that each regional curve has shifted outward (the reason for this simplifying assumption will be clarified below). Then, consider the estimate of the shift (the coefficient on the time trend) that we obtain from estimating the conventional UV curve (for example, Model 1 in Table 1). Let this estimate be x per cent over the time period under consideration; x is an estimate of the total shift of the conventional national curve, which incorporates both intra- and interregional effects. Now consider the estimate from the aggregate equation 10. Let this estimate be y per cent; y is an estimate of the shift in the national curve that contains intraregional aggregation effects only. Suppose $y = x$. In this case, we would conclude that the combined effects are equal to the intraregional effects alone and thus that interregional effects do not obtain. We are safe in doing so only if we have found that all the regional curves have shifted outward: it is perfectly conceivable that if some of the regional curves have shifted inward, then they might offset the outward interregional shift. In other words, we have no identification problem if all the regional curves shift outward.

Now assume that $x > y$. In this case x minus y is an estimate of interregional effects (still assuming that all curves have shifted outward). Thus it is conceivable that there might not be any intraregional shifts ($y = 0$), but that, nonetheless, the national curve has shifted. The shift of the national curve would then be entirely due to interregional effects.

Finally, if we find $x < y$ (and the regional curves have all shifted outward), then we would assume that interregional effects have been working in the opposite direction.

Why not simply use the weighted sum of the shifts calculated by estimating the separate regional equations as a measure of the national shift? Intuitively,

it is because when we carry out the Zellner estimation of the system, we are not weighting the relative contribution of each region in filling vacancies, and thus this contribution is not taken into account by the estimated coefficients on the time trends. The correctly specified aggregate equation corrects for this by weighting the normalized help-wanted-index variable and then carrying out the estimation.

Estimating Intra- and Interregional Effects

Recall from Table 3 that each regional curve had shifted outward over time: the assumption of our previous exercise is therefore satisfied. Table 8 (Model 2) presents the results of our estimation of equation 10, in which the estimated coefficient on the time trend gives us a measure of the intraregional shift. This shift is found to be about 3 percentage points over the period 1966-88. The shift of the conventional UV curve, presented in Table 1, yields a total shift of approximately 6.5 percentage points. Given our discussion above, this yields an estimate of the shift due to interregional effects of around 3.5 percentage points. These results confirm that interregional imbalances are a major factor in increasing the national level of mismatching.

Abraham [1987] argued that in order for increasing interregional imbalances to cause a shift in the national UV curve, the regional unemployment/vacancy loci must exhibit convexity.[17] The importance of the convexity assumption can be illustrated by examining Chart 6 (Panel A). Suppose that all regions share the same unemployment/vacancy relationship implied by the national UV curve. Then let all the regions be at point A on the UV curve. The national vacancy rate and the national unemployment rate are then equal to the individual regional rates v_0 and u_0. Let the demand for labour increase in some regions and decrease by an offsetting amount in other regions. Each of these regions will now move to a new equilibrium away from point A. If labour is immobile between regions, the region whose labour demand has increased will now move to a point such as B, with higher vacancies and lower unemployment. The region whose labour demand has decreased will be at a point such as C, with lower vacancies and higher unemployment. Notice that the national demand for labour has not changed but that regional dispersion has increased. Given that the unemployment/vacancy relation is convex within each region, this increased dispersion will result in a rise in the national vacancy rate from v_0 to v_1 and in the national unemployment rate from u_0 to u_1. The national equilibrium will now be at point D – a point on a new UV curve that represents the average of the regional shifts. Increased dispersion, as measured by dispersion in the regional unemployment rates, has thus resulted in an outward shift in the national UV curve. As can be seen from Panel A of Chart 6, the impact of these dispersions will be larger, the more pronounced is the curvature of the UV curve.

Table 8

Shift in the Unemployment/Normalized Help-Wanted-Index Curve, by Region, Canada, 1966-88[1] (Annual Data)

Dependent variable: national unemployment rate

	Model 1	Model 2
National normalized help-wanted index (NHWINAT)	–0.57 (13.63)	...
Adjusted normalized help-wanted index Atlantic region (ANHWIATL)	...	0.001 (2.93)
Quebec (ANHWIQUE)	...	0.0002 (0.43)
Ontario (ANHWIONT)	...	–0.004 (7.23)
Prairie region (ANHWIPRA)	...	–0.0003 (4.61)
British Columbia (ANHWIBC)	...	–0.0002 (1.74)
Constant	8.75 (19.63)	...
Adjusted constant Atlantic region	...	–1.47 (1.62)
Quebec	...	–0.27 (0.93)
Ontario	...	0.28 (1.10)
Prairie region	...	0.30 (1.57)
British Columbia	...	1.03 (1.82)
Shift dummy (1974 on)	1.26 (3.61)	...
Shift dummy (1972 on)	...	1.37 (5.29)

Table 8 (cont'd.)

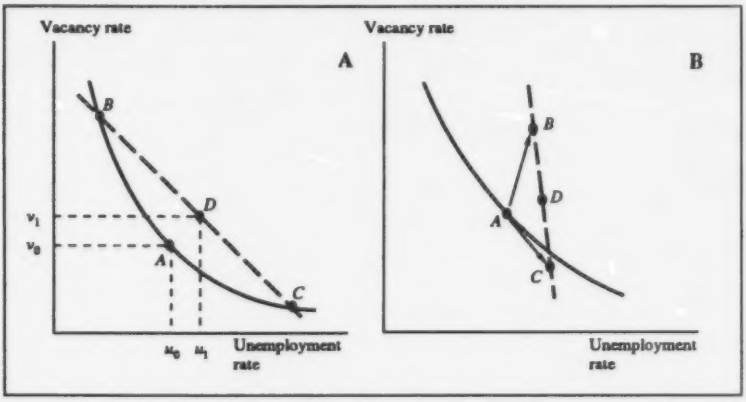
	Model 1	Model 2
Time	0.23	0.13
	(8.57)	(2.42)
Summary statistics:		
R^2	0.98	0.996
Durbin-Watson	1.73	1.99

1 All equations were corrected for serial correlation. The numbers in parentheses are *t*-statistics.

SOURCE Estimates by the authors, based on data from Statistics Canada [1988*a*] and [1988*b*].

Chart 6

Regional Dispersion, Vacancies, and Unemployment



The above argument rests heavily on the convexity of the UV curves. However, increased regional mismatch can affect national vacancy and unemployment rates even if the UV curves are not convex. This will occur because of the presence of asymmetries in the responses of vacancies and unemployment to changes in labour demand. It has been suggested that vacancies will respond instantaneously to labour demand shocks but that unemployment will adjust with a lag [Abraham 1987]. Consider the previous example, where labour demand increases in one region and falls equally in another. The impact on the current time period is that both vacancies and unemployment will rise. This result is illustrated in Panel B of Chart 6. The

unemployment/vacancy point for the region experiencing an increase in labour demand is now *B* and the point for the region with lower labour demand is now *C*. The average of the changes in the current period is shown at point *D*, halfway between *B* and *C*. This effect will tend to be accentuated if there is no mobility of labour between the regions. If there are indeed lags in the response of unemployment rates to changes in labour demand, increased regional dispersion in employment growth rates will lead to increases in both national vacancies and unemployment, shifting the national UV curve outward.

Whether the national and regional UV curves are convex to the origin can be examined by looking at the estimated coefficient on the NHWI squared term. The technical condition for convexity requires that this coefficient must have a positive sign. The results presented in Table 1 (Models 1 and 2), Table 2 (Models 1 and 2), and Table 3 (Model 1) confirm the convexity of the national and regional UV relationships.

Interregional Effects: Dispersions in Unemployment Rates and Employment Growth Rates

The evidence presented so far has shown that interregional effects have shifted the national UV curves. Here, we examine two manifestations of interregional effects – dispersions in regional unemployment rates, and employment growth rates.

Dispersion of Regional Unemployment Rates

We calculated an unemployment dispersion index (*UDI*, see equation 11) reflecting each region's deviation from the national unemployment rate, weighted by its share of the overall labour force.

$$UDI = \left[\sum_{i=1}^{5} \frac{L_{it}}{L_t} (U_{it} - U_t)^2 \right]^{1/2}, \tag{11}$$

where, L_{it} is the labour force in region i at time t; L_t is the total national labour force; U_{it} is the unemployment rate in region i at time t; and U_t is the national unemployment rate.

Column 1 in Table 9 shows the dispersion of unemployment rates across regions. A general outward trend in the index may be observed over the period 1975-88, reflecting the fact that labour markets were slacker during the mid-1970s and the 1980s than during the late 1960s and early 1970s. But this is not the sole story. This fact is borne out by the results of a regression that

uses the unemployment-rate dispersion index as the dependent variable and where the explanatory variables were the unemployment rate (either measured or fixed-weight) and a post-1974 shift dummy. The estimated coefficient of the dummy variable was positive and highly significant, suggesting that a discrete shift in the dispersion index caused by factors other than variations in the unemployment rates took place in the post-1974 period.

Table 9

Dispersion of Unemployment Rates and Employment Growth Rates across Regions and across Industries, Canada, 1966-89

	Regional dispersion		
	Unemployment rates (1)	Employment growth rates (2)	Industrial dispersion[1] (3)
1966	0.97	–	1.57
1967	0.97	0.98	1.62
1968	1.12	1.44	1.20
1969	1.34	1.25	1.15
1970	1.27	0.86	1.45
1971	0.95	0.56	0.99
1972	1.26	1.11	1.53
1973	1.29	0.81	1.23
1974	1.48	0.94	1.48
1975	1.70	0.63	1.62
1976	1.95	1.22	1.27
1977	2.26	1.02	1.12
1978	2.26	0.93	0.92
1979	2.14	0.63	1.25
1980	2.10	1.53	1.20
1981	2.29	1.38	0.91
1982	2.39	1.55	1.76
1983	1.98	0.91	1.01
1984	2.34	1.33	1.00
1985	2.58	0.73	0.92
1986	2.52	0.82	1.21
1987	2.54	1.09	0.99
1988	2.45	0.77	0.90
1989	2.24	0.62	1.01

1 As measured by employment growth rates ($\sigma * 100$).
Source Estimates by the authors.

The results confirm that the increased dispersion in unemployment rates across regions has been an important factor for some of the shift of the UV relationship.

Dispersion of Regional Employment Growth Rates

Does the increased dispersion in employment growth rates across regions matter for interregional effects to be significant? To examine this we calculated an employment dispersion index across regions as follows:

$$EDI = \left[\sum_{i=1}^{5} \frac{E_{it}}{E_t} (\dot{E}_{it} - \dot{E}_t)^2\right]^{1/2}, \tag{12}$$

where E_{it} and $\dot{E}_{it}$ are employment levels and employment growth rates in region i, and E_t and $\dot{E}_t$ are national employment levels and employment growth rates, respectively. This dispersion measure is simply the standard deviation of the regional employment growth rate from the national employment growth rate.

Column 2 of Table 9 reports the dispersion in actual employment growth rates across regions. An increase in this index can serve as a proxy for the increasing mismatch in desired employment across regions and can cause an outward shift in the national UV curve. The dispersion in employment growth rates across regions remained relatively uniform during the 1970s except in 1975 and 1979, when it fell to its lowest levels since 1967. The experience of the 1980s present an interesting picture. Over the recession and recovery phase of 1981-84, the dispersion in employment growth jumped sharply, but then it fell during the period 1985-89 to close to its 1970-79 average. The experience of the 1980s suggests that insofar as the dispersion in employment growth rates across regions has been responsible for the outward shift in the national UV relationship in the earlier part of the decade, the curve should have shifted inward in the latter part of the decade.[18]

Industrial Mismatches and the UV Curve

Mismatches across industrial sectors affect the UV curves in the same way as mismatches across regions. An increase in sectoral mismatch will shift the UV curve by increasing unemployment at a given level of vacancies. This section examines the evidence pertaining to the impact of sectoral employment dispersion on the national and regional UV curves. The theoretical explanation for the effect of sectoral employment dispersions on labour market mismatches can be found in the sectoral-shifts hypothesis [Lilien 1982]. The basic premise

of this hypothesis is that the natural rate of unemployment is intimately linked to the process of labour reallocation. In particular, the pace of labour reallocation occurring as a consequence of intra- and intersectoral shifts in employment is critical in determining the natural rate. The slower the pace, the higher the natural rate is likely to be. Also, according to this hypothesis, the natural rate will vary over time with the required amount of labour reallocation..

The sectoral-shifts hypothesis represented a departure from the traditional macroeconomic view that aggregate fluctuations were generally caused by aggregate shocks – i.e., that much of the observed unemployment was cyclical in nature. Lilien suggested that events – such as rapid technological change, shifts in product demand, or a major change in relative prices (for example, the oil price shocks of the late 1970s) – lead firms to adjust the size of their labour force over and above the normal continual adjustments. This adjustment process can result in the separation of some workers from their jobs. If the pace of labour reallocation is slow, it will take time for separated workers to be matched to new jobs, and some increase in the level of unemployment will be inevitable.

The empirical testing of the impact of sectoral shifts on unemployment has been mainly at the aggregate level. Researchers have generally estimated a reduced-form unemployment equation that included a measure of sectoral employment dispersion as an explanatory variable. In operational terms, this variable was defined by Lilien [1982] as the standard deviation of the employment growth rates of individual industries from the average for all industries, weighted by the share of each industry's share in total employment (σ).[19]

Column 3 in Table 9 reports dispersion in employment growth rates across industries (σ) over time. Sigma (σ) is calculated as:

$$\sigma = \left[\sum_{i=1}^{8} \frac{E_{it}}{E_t} (\Delta \log E_{it} - \Delta \log E_t)^2 \right]^{1/2}, \qquad (13)$$

where E_{it} is the employment in sector i at time t and E_t is the total employment. A group of seven industries was considered in constructing this index – construction, agriculture, commercial services, manufacturing, noncommercial services, other primary industries, and public administration.

The mean dispersion in industry employment growth rates is higher before 1975 than after. The dispersion jumps sharply in 1982, but that can be attributed mainly to the recessionary shock during that period. The dispersion index fell over the recent recovery and expansionary phase in the economy.

A continuation of this trend will imply an inward shift of the aggregate UV curve.

Tables 5 and 6 report the results of quarterly estimations of the national UV curve for the period 1976-88. For completeness, the initial equations reported in Tables 1 and 2, where the unemployment rate is the dependent variable, are also re-estimated. The new results suggest that the initial results generally hold for the quarterly estimates as well. Models 5 and 7 in Table 5 (and Models 3 and 5 in Table 6) report the estimates where σ was included as an independent variable. It is clear that the industrial employment dispersion, as captured by σ, did not matter in determining the national unemployment rate over this period.

We also calculated industrial employment dispersion indices by region. For four of the five regions – the Atlantic provinces, Quebec, Ontario, and the Prairies – the dispersion indices showed no significant outward or inward movement. The dispersion index for British Columbia experienced a sharp increase in 1982, but it seems that the magnitude of the imbalances has receded since then.

The estimations of the regional UV curves where regional σ are included as explanatory variables are reported in Table 7 (Models 3 and 5). The only region for which the variable is significant is Quebec, but here, too, the sign of the coefficient is negative, suggesting that industrial employment dispersion in this region, if anything, has contributed to the inward shift of the regional UV relationship over the period 1976-88.

Conclusions

Recent efforts to explain the high and persistent Canadian unemployment rates have concentrated on estimating the natural rate of unemployment. Examples of this include McCallum [1987]; Fortin [1989]; and Burns [1990]. The consensus seems to be that the natural rate has risen in recent years, implying the presence of substantial structural unemployment. Deficient aggregate demand is also seen to be a cause of the rise in unemployment, although the extent of its contribution differs among the various studies.

This paper has taken an alternative approach and concentrated on the impact of structural imbalances that cause mismatch between the level of unemployment and vacancies. We have estimated the unemployment/vacancy relationships for Canada as a whole and also for the five regions within Canada, using two proxies for the unavailable data on vacancies – the normalized help-wanted index and a derived vacancy rate. The factors causing shifts in this relationship have been analysed. The major conclusions of this analysis are:

- The national and the regional unemployment/normalized help-wanted-index relationships have shifted outward over the period 1966-88, indicating growing structural imbalances.

- The increase in the proportion of long-term unemployment to total unemployment is the major reason for the shift in the national unemployment/vacancy relationship, as well as in those for the Atlantic provinces, British Columbia, and the Prairies.

- The analysis at the national level reveals that both inter- and intraregional effects have played a significant role in the shift of the national UV relationship. However, interregional disparities were found to be the dominant factor, accounting for 54 per cent of the total shift in the national relationship.

- Sectoral employment dispersion does not seem to matter in the shifts in the national or in the regional unemployment/vacancy loci.

The results of this study indicate that structural unemployment increased in Canada during the 1970s and 1980s. The trend is noticeable not only at the national level but also in the regions, where the impact has been varied. The Atlantic region has experienced the highest increase, followed by British Columbia, Quebec, Ontario, and the Prairies. The increase in structural imbalances across all the regions suggests that if policymakers are to reduce unemployment, macroeconomic policy must be supplemented by a range of specific policies to improve the functioning of labour markets.

The significant influence of long-term unemployment as a proportion of total unemployment constitutes a serious policy concern. The increase in the proportion of the long-term unemployed over the recent business cycle, together with the uneven distribution of the burden of long-term unemployment across age categories and regions, provide important reasons why this phenomenon should be a principal focus of labour market policy in Canada. This conclusion is reinforced by the implications of long-term unemployment for labour market flexibility and the presence of "scarring" effects on individuals. In previous work, Rahman and Gera [1990] argued that the Job Development Program of the Canadian Jobs Strategy, combined with the Canada Employment Centres, currently provide a comprehensive set of interlinked services for the long-term unemployed. While these programs have generally performed well, improvements could be made to the design of the programs. For example, the current eligibility criterion (unemployment for 24 weeks out of the last 30) could be shortened to four months. This earlier identification will prevent further skill erosion. More importantly, there is a need within these programs to specifically target older workers. It is this group which is most prone to long-term unemployment and most in need of help.

Finally, a job-vacancy survey would assist policymakers in analysing the growing mismatches between unfilled job vacancies and the attributes of the unemployed. Although there are well-recognized difficulties in obtaining creditable vacancy data, these obstacles can be overcome by adequate funding, research, and time. The cost of providing such data would possibly not be more than the costs incurred by misguided policies pursued without the insights that job-vacancy data might provide.

Notes

1 For details of the Job Vacancy Survey, see Statistics Canada [1978].

2 The unpublished data were provided by Employment and Immigration Canada.

3 Statistics Canada [1988*a*]. For more details on the construction of the series, see the technical notes in that publication.

4 The Canadian index differs from its U.S. counterpart mainly by the measurement chosen. Whereas the Canadian index is based on column space, the U.S. index measures the number of advertisements. It is only recently that Statistics Canada has started compiling help-wanted indices from a count of the number of help-wanted ads published in 22 metropolitan newspapers. For details, see Statistics Canada [1988*a*].

5 The equations in Table 1 are not structural models. They provide a simple way to examine whether the relationship between the help-wanted index and unemployment has changed. This way of testing is quite common in the literature [see, for example, Summers 1986; and Abraham 1987].

6 Similar evidence was found by Reid and Meltz [1979] and Betcherman [1986]. For evidence on the outward shift in the U.S. unemployment/help-wanted-index relationship, see Abraham [1987]; Medoff [1983]; Baily [1984]; Cohen and Solow [1967]; Summers [1986]; and Blanchard and Diamond [1989]. For the United Kingdom, see Jackman, Layard, and Pissarides [1984]; Jackman and Roper [1987]; and Dow and Dicks-Mireaux [1958]. For Germany, see Franz [1987]. For evidence on a group of European countries, see Budd, Levine, and Smith [1987]. For the theoretical underpinnings of the UV relationship, see Hansen [1970] and Pissarides [1985].

7 The model is similar to those of Layard and Nickell [1987] and Abraham [1987].

8 Pissarides [1986] has shown that equation 3 exhibits constant returns to scale. We can therefore divide both sides by unemployment (U) to get $A/U = f(gV/U, c, mm)$, where A/U is the outflow rate, V/U is the ratio of the vacancies to job seekers, and mm measures mismatches.

9 Abraham [1987] shows that this steady-state unemployment/vacancy locus is negatively sloped and is convex to the origin. According to this simple model, exactly where along its UV locus a given labour market settles will depend upon the ratio of desired employment to the size of the labour force.

10 In the literature on the Phillips curve, this notion is commonly known as "Perry-weighted" unemployment rates [see Perry 1970]. In our calculations, the age/sex adjustment is based on a decomposition of the labour force into 12 categories – men and women aged 15-19, 20-24, 25-34, 35-44, 45-54, and 55 years and over. Recently, Summers [1986] has argued that there is no reason why the logic of adjusting changes in the composition of the labour force should be restricted to its age/sex dimension. The "Perry-weighting" exercise can be applied to other changes in labour force composition, such as marital status, schooling, and industry. Less educated workers tend to have higher unemployment rates than do more educated workers. However, the current generation of Canadians is much more educated than its counterpart of 20 years ago, and this fact should therefore contribute to a lowering of unemployment rates. Manufacturing, construction, and mining industries tend to have higher average unemployment rates than do services, trade, and finance, and the share of the labour force working in the latter group of industries has increased. Single persons tend to have higher unemployment rates than do married persons, and the share of the married labour force in Canada has been declining over time. Thus it is not clear a priori that changes in the composition of labour force have resulted in an increase in the measured unemployment rate. The results of this exercise, reported in Gera et al. [1988], show that quantitatively more important than the age/sex adjustment in the 1980s is the adjustment for the changing marital status of the labour force. The marital adjustment rose to 0.4 in the late 1970s, but unlike the age/sex adjustment, it did not decline during the 1980s. Finally, the industry adjustment indicates that changes in the industrial composition of the labour force have worked to decrease unemployment slightly.

11 For an excellent discussion of these issues, see *Commission of Inquiry on Unemployment Insurance Report* (Ottawa: Supply and Services Canada, 1986).

12 Professor Pierre Fortin very kindly provided these data to us.

13 In a similar vein, Betcherman [1986] argued that an increasingly youthful labour force and a growing liberalization of unemployment insurance seem to have been significant determinants of the initial rise in structural imbalances around 1972. The contribution of this high level of imbalances after 1975, however, cannot be attributed to these demographic or institutional factors.

14 The facts about Canadian federal and provincial employment protection laws are described in "Rapid reference charts (dealing with employment standards as of October 1, 1986)," Federal-Provincial Relations Branch, Labour Canada, 1986.

15 Canada is not the only country to have recently experienced a rise in long-term unemployment. The European members of the OECD, Japan, and the United States have also seen this type of unemployment grow. The major difference between Canada's experience and those of the other OECD countries (particularly those in Europe) lies in the magnitude of the problem in this country. For a detailed discussion of this, see Rahman and Gera [1990].

16 For a detailed description of the regional distribution of long-term unemployment and recent changes in this distribution, see Rahman and Gera [1990].

17 For a first clear presentation of this issue in a somewhat different context, see Lipsey [1960].

18 We calculated an additional measure of regional mismatch. This measure presupposes that a good match between regions will occur if the ratio of unemployment to vacancies is the same in each region. The incidence of structural unemployment can then be measured by the proportion of the unemployed who would have to be in a different region for perfect matching to take place. This measure is then given by

$$\left[\frac{1}{2}\sum_{i=1}^{5} / U_i - V_i /\right]$$

where U_i and V_i are the proportion of unemployed and vacancies in region i. Based on the notified-vacancy data, our calculations indicate that the regional mismatch between the unemployed and vacancies was reduced during the period 1982-83 to 1984-85, but has recently increased, reaching the levels of the late 1970s. This increase in mismatch suggests a rise in structural unemployment in Canada over this period. For evidence, see Gera et al. [1988].

19 Much of the empirical debate in the macroeconomic empirical literature has been about the legitimacy of the use of this proxy as a measure of sectoral shifts. The controversy has centred around such questions as whether the employment-dispersion measure is independent of aggregate-demand influences or whether it is a truly exogenous variable [Abraham and Katz 1986; Kaliski 1987; and Neelin 1987]. For Canadian evidence at the aggregate level, see Samson [1985]. For a detailed discussion of the sectoral-shifts hypothesis and some microeconomic evidence for Canada, see Gera and Rahman [1991].

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